CONTACT LENS OR THE LIKE

BACKGROUND OF THE INVENTION

This invention relates particularly to extraocular lens structures for contact application to the cornea, for wear in place of spectacles.

Conventional contact lenses, be they of the hard or soft variety, are circular, of 12 to 14 mm diameter, and thus cover a relatively large area, approximating the area defined by the perimeter of the iris. They are larger than optically necessary because the only light rays they need accommodate are those permitted by the pupil, and their relatively large area is a source of discomfort because fluid on the cornea is thereby precluded natural flow and circulation; as a consequence, the wearer of contact lenses must accustom himself to relatively frequent removal, cleaning and replacement of his lenses. But if the conventional contact lens were any smaller, it would be virtually incapable of manipulation by the wearer, and it would also be prone to move off-axis, over the corneal surface. Furthermore, liquid and gas-permeable plastics have recently been used, but lenses of such materials tend to build enzyme deposits and present difficulties in regard to cleaning and sterilization.

As far as I am aware, glass has been foreclosed as a contact-lens material, due to its high density and fragility compared to that of plastic materials. And the manufacture of contact lenses has involved plastic-molding techniques where prescription curvatures are derived from a molding cavity, or by lathe-cutting, i.e., they are not expressly not ground into the lens itself. And being circular, there is no way that astigmatism can be corrected through conventional contact lenses because there is no way of identifying orientation parameters of the astigmatism.

BRIEF STATEMENT OF THE INVENTION

It is an object to provide an improved extraocular or contact-lens construction.

It is a specific object to provide such a construction wherein the lens element itself may be of substantially smaller size, consistent essentially only with its optical requirements, and wherein haptic structure engaged to the lens element provides stabilized positioning for the lens element.

Another specific object is to meet the above objects with structure which is readily self-adapting to the curvature of the cornea.

It is also a specific object to provide structure meeting the above objects and permitting the employment of optically finished glass as the material of the lens element.

A further object is to provide a contact-lens construction inherently capable of supplying astigmatism correction for the wearer.

Still another object is to provide a contact-lens structure of the character indicated that can be cleaned and sterilized by boiling in water or by autoclaving.

It is a further specific object to provide protective structure in a contact lens whereby glass may be safely used as the optical element.

A general object is to meet the above objects with relatively simple structure which lends itself to quantity and precision manufacture, which inherently provides improved comfort to the wearer, and which involves substantially reduced demands for removal, cleaning and replacement.

The foregoing and the other objects and features of the invention are achieved in contact-lens constructions (a) wherein the lens element is of substantially reduced diameter (e.g., 5 to 6 mm), and is thus essentially only of the size required to serve a fully dilated pupil and (b) wherein fenestrated compliant haptic structure engages the lens element and adheres to the wet surface of the cornea for stabilized support of the lens element. The result is a much lighter-weight article, of less bulk than conventional contact lenses, and permitting the use of optically finished glass for the lens element.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be illustratively described in conjunction with the accompanying drawings, in which:

FIG. **1** is a simplified front-elevation view of a human eye to which contact-lens structure of the invention has been applied;

FIG. **2** is an enlarged view of the lens structure of FIG. **1** to show haptic detail;

FIG. **3** is a side-elevation view of the structure of FIG. **2**;

FIG. **4** is a view similar to FIG. **3** but with the separate parts in exploded relation;

FIG. **5** is a view similar to FIG. **4** to show a modification;

FIG. **6** is a sectional view, taken at 6—6 of **FIG.** 2 and on a further-enlarged scale;

FIG. **7** is a view similar to FIG. **2**, to show a modification;

FIGS. **8** and **8A** are fragmentary views, otherwise similar to FIGS. **7** and **2**, respectively, to show further modification;

FIGS. **9** and **9A** are similar to FIGS. **8** and **8A**, to show further modification; and

FIGS. **10** and **11** are views similar to FIGS. **3** and **4**, respectively, to show still further modification.

DETAILED DESCRIPTION OF THE INVENTION

In the form of FIGS. **1** to **4**, the invention is shown in application to an extraocular or contact-lens assembly comprising a central lens element **10** which may be of molded plastic, but which is preferably of optically finished glass, ground to prescription curvature (e.g., plano-convex or meniscus) and of outside diameter D_1 which equals or slightly exceeds the diameter of the fully dilated pupil of a human eye. As is clear from FIG. **1**, the diameter D_1 is very much less than the diameter D_2 of the iris **12** of the eye **11**. Generally speaking, the diameter D_1, is in the range 5 to 6 mm, and the diameter D_2 is in the range of 12 to 14 mm, the latter being the diameter of a conventional contact lens.

Fixed to and centrally supporting the lens element **10** is a haptic **13** of much larger included area than the lens element **10**. Haptic **13** comprises two thin sheets **14-15** of plastic material laminated to the front and back surfaces of lens element **10**, and to each other in regions radially outside element **10**; in these outer regions, haptic **13** is characterized by very substantial fenestration, meaning that the structure is primarily "open", for normal air or "breathing" exposure of the surface of the cornea. Such fenestration may be by photographically delineated milling, before or after lamination of the sheets **14-15** to each other, relying upon such chemical-etching, plasma and other milling techniques as are